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ES320 Thermal-Fluids Engineering

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Osborne Reynolds

If you have studied Fluids Engineering before, maybe you know what the Reynolds number is. If you have not studied yet, this is the best explanation of the Reynolds number: "the number Re, a dimension less parameter that deter mines the behavior and characteristics of viscous flow patterns (2)." This famous Fluids' theory was figured out by British mechanical engineer, physicist, mathematician, and educator Osborn Reynolds. It is said that his whole life contributed to the science and engineering world a great deal.

Osborn Reynolds was born on August 23, 1842 at Belfast, Ireland. And, he was born in an Anglican Church family. This is the reason why Osborn was able to get a lot of education during the potato famine era, although "his father was a priest in the Anglican church (7)," father had "an academic background having 'been a Cambridge wrangler (1)' and graduated from Cambridge in 1837, being elected to a fellowship at Queens' College, and being headmaster of first Belfast Collegiate School and then Dedham School in Essex (7)." Moreover, Osborne's father, grandfather, and great-grandfather were rectors of Debach-with-Boulge, so Osborne grew up in a strict religious family. In the other words, following his academically outstanding family background, he had already been given a passport into the elite when he was born.

In his early boyhood, he was mostly educated by his father who "in addition to being an extremely able to mathematician had a keen interest in mechanics and mechanical mattes and took out a number of patents concerned with improvement to agricultural equipment and machinery (5)." Because of his father's ardent affects, young Osborne was becoming devoted the science world, especially in mathematics and mechanical engineering. However, he did not

go into university right after his secondary school because he preferred to apprentice with a well-known inventor and mechanical engineer, Edward Hayes, in 1861. During this a year of manufacturing experience, Osborne saw real engineering products such as steamers. Because he wanted to take more high advanced education, he “decided to go to Cambridge to take a course in mathematics (5).” “At Cambridge, Reynolds was a successful mathematics student, passing the mathematical tripos in 1867 as seventh wrangler and receiving a fellowship, like his father, at Queens’ College (1).” Then, he approached the civil engineer (Mr. John Lawson)’s office in London, and he worked as a civil engineer.

A year later in 1868, although Osborne did not have enough engineering experience, he sent an application and “was elected to the newly instituted Chair of Engineering at Owens College, which became the Victoria University of Manchester (5).” Reading through his application, it is easy to understand that he was really influenced by his father. “In his application, Osborne Reynolds stated, ‘from my earliest recollection I have had an irresistible liking for mechanics and physical laws on which mechanics as a science are based. In my boyhood I had the advantage of the constant guidance of my father, also a lover of mechanics and a man of no mean attainment in mathematics and their applications to physics’ (5).” He held his position, Professor of Engineering at the University of Manchester, until he retired.

In his early days, he worked on magnetism and electricity, but soon after he emphasized hydraulics and hydrodynamics. Also, he studied the electromagnetic properties of the sun and comets, and he considered tidal motions in rivers (7). Due to his powerful research working in physics and engineering field, many institutes awarded him for his wonderful achievements. For instance, “he was awarded the degree of M.A. by the University of Cambridge in 1880 and elected Honorary Fellow of Queens’ College Cambridge in 1882. In 1877, he was elected a Fellow of the Royal Society and in 1888 received the Royal Medal. In 1883, he became a

member of the Institution of Civil Engineers and was awarded the Telford Premium in 1885. The University of Glasgow conferred the Honorary Degree of LL.D. on him in 1884. He was elected President of the Manchester Literary and Philosophical Society in 1888 and received the Dalton Medal in 1903 (5)."

Due to ill health, Osborne retired from his active work in 1905. "Not only did he deteriorate physically but also mentally, which was sad to see in so brilliant a man who was hardly 60 years old (7)." He spent his last years at Watchet in Somerset, England, and he died on February 21, 1912 at the age of sixty-nine. "He left three sons and a daughter by his second marriage (1)."

It is difficult to describe the variety of Osborne's work, through which he developed not only basic theories, but applied the fundamentals "to a wide range of engineering problems including ship propulsion, pumps, turbines, estuaries of rivers, cavitations, condensation of steam, thermodynamics of gas flow, rolling friction, and lubrication (6)." Thus, he is not only the man who figured out "Reynolds Number," "Reynolds Equation," "Reynolds Stress," and "Reynolds Analogy" which were milestone of his research work. He is also the man who involved mathematics, physics, thermodynamics, and fluid dynamics into the whole meaning of the engineering world and expanded the engineering field to a new era.

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